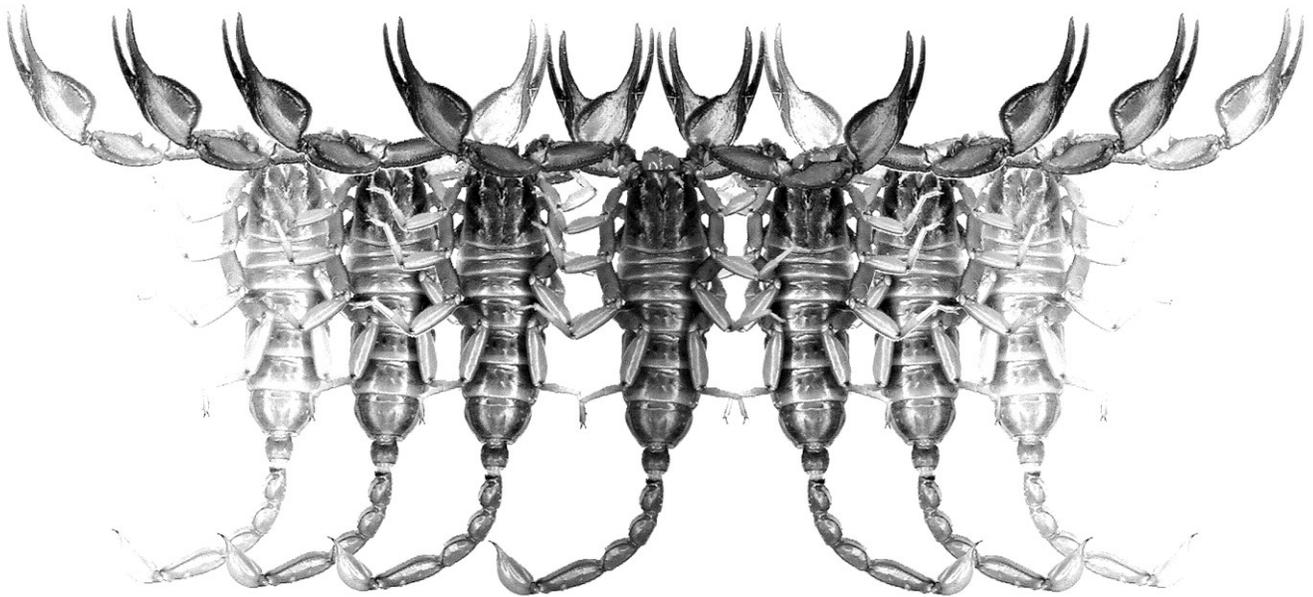


Euscorpilus

Occasional Publications in Scorpiology



Two new scorpions from the Puerto Rican island of Vieques, Greater Antilles (Scorpiones: Buthidae)

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Euscorpius

Occasional Publications in Scorpiology

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Two new scorpions from the Puerto Rican island of Vieques, Greater Antilles (Scorpiones: Buthidae)

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Summary

Two new scorpion species of the family Buthidae are described herein: *Microtityus vieques* sp. n. (a member of the subgenus *Parvabsonus* Armas, 1974) and *Tityus alejandroi* sp. n. (belonging to the “quisqueyanus” species-group). Both were collected from pitfall traps in the Puerto Rican satellite island of Vieques, in the Greater Antilles, and the former represents the first official record of the occurrence there of the genus *Microtityus* Kjellesvig-Waering, 1966. As expected, the new species have their closest relatives in Puerto Rico. Fully illustrated descriptions and detailed comparisons are provided. Additionally, two other Puerto Rican species of *Tityus* currently not assigned to any group are herein formally transferred to the “quisqueyanus” species group: *Tityus angelesae* Santiago-Blay, 2009 and *Tityus juliorum* Santiago-Blay, 2009. After this contribution, the scorpion fauna of Puerto Rico is now composed of 19 species.

Introduction

As a perfect reflection of its geographic extension, the scorpion fauna of Puerto Rico (including Isla de Mona and excluding the Virgin Islands) is the third most diverse across the Greater Antilles: it is composed of two families, seven genera, and 17 described species, according to compilations and the most recent contributions (Armas, 1984, 1988, 2001, 2005, 2009; Santiago-Blay, 2009; Teruel & Sánchez, 2009; Teruel et al., 2014); see a complete and updated checklist below. Nevertheless, the picture is very different with respect to the island of Vieques: despite its being the second largest satellite of Puerto Rico (135 km²) and its location very close to its coast (10 km to the southeast), only two scorpion species are confirmed to occur there, both members of the family Buthidae C. L. Koch, 1837: *Centruroides griseus* (C. L. Koch, 1844) and *Tityus obtusus* (Karsch, 1880), recorded by Santiago-Blay (2009) and Teruel & Sánchez (2010), respectively.

As part of a continuous revision of the scorpion fauna of Puerto Rico, conducted for more than a decade by our team (Rolando Teruel, Alejandro J. Sánchez, and Mel J. Rivera) and incidental collaborators, we were allowed to revise a small parcel of scorpions recently collected at Vieques and deposited in the collection of the Universidad de Puerto Rico-Recinto Mayagüez. We found the sample to be composed of two undescribed

species of the genera *Microtityus* Kjellesvig-Waering, 1966 and *Tityus* C. L. Koch, 1836, which are described in the present paper.

It is worth to mention here that the new findings include two important additions: **a)** the first record of *Microtityus* from Vieques and the third species of the genus known to occur in Puerto Rico, where it remained undiscovered for centuries until the first record was given by Teruel et al. (2014); **b)** the first scorpion species apparently endemic from this small island (however, this needs to be confirmed by additional samples in adjacent islands). With this contribution, the scorpion fauna of Puerto Rico is raised to 19 species, four of them known to occur in Vieques.

Methods & Material

The specimens were studied, measured and photographed under a stereomicroscope, equipped with a Visionary Digital® image stacking device and a Canon 7D digital camera. The high-resolution digital images obtained were then slightly processed with Adobe Photoshop®CS5, only to remove background and to optimize brightness and contrast for print.

Nomenclature and measurements follow Stahnke (1971), except for trichobothriotaxy (Vachon, 1974), metasomal carinae (Francke, 1977), pedipalp chela carinae (Acosta et al., 2008, as interpreted by Armas et al.,

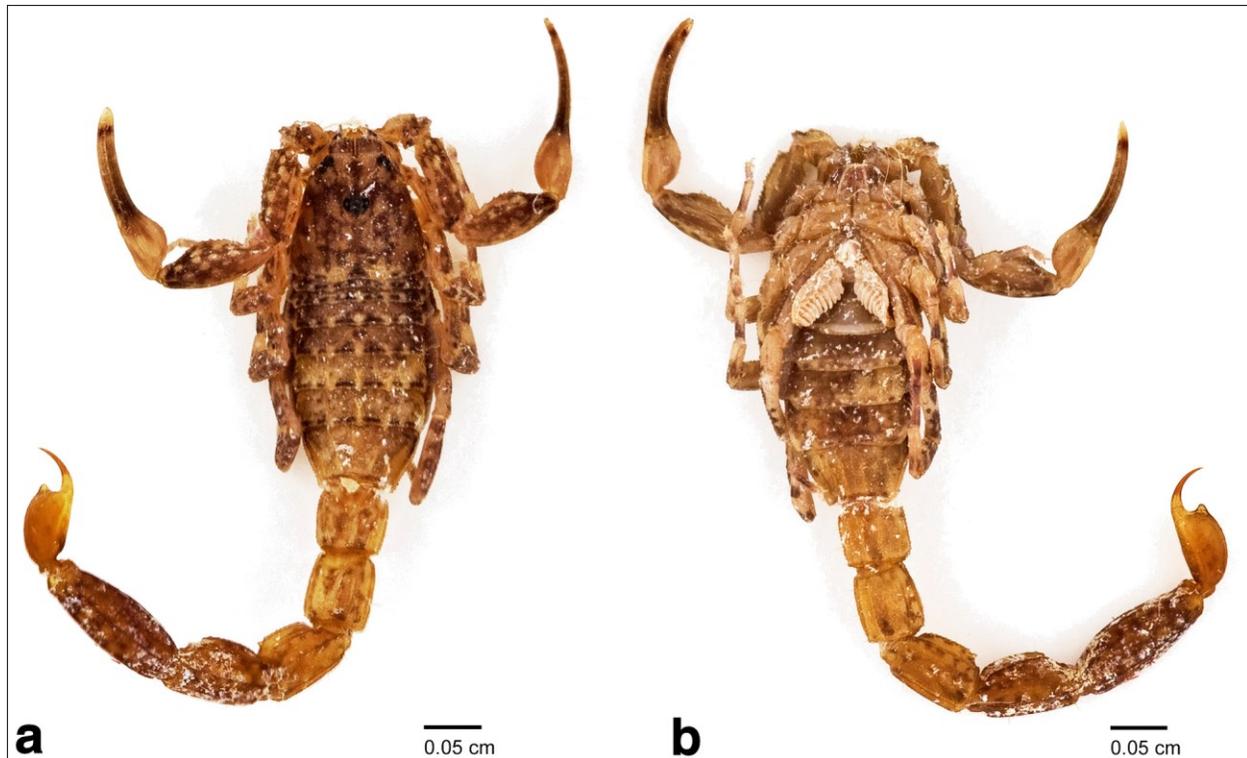


Figure 1: Holotype adult male of *Microtityus (Parvabsonus) vieques* sp. n.: dorsal (a) and ventral (b) views.

2011), and sternum (Soleglad & Fet, 2003). Unless otherwise noted, all morphologically diagnostic characters mentioned in the text refer to adults of both sexes.

Specimens studied herein are preserved in ethanol 80% and deposited in the collection of the Universidad de Puerto Rico-Recinto Mayagüez, Puerto Rico (UPRM).

Systematics

Family Buthidae C. L. Koch, 1837

Microtityus (Parvabsonus) vieques Teruel, Rivera et Santos, sp. n.

(Figures 1–4, 9)

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TYPE DATA. Puerto Rico, Vieques Municipality, Vieques Island (most likely from Monte Pirata, in the western part of the island), pitfall trap, March 2011, J. L. Herrera, 1 adult ♂ holotype, 1 adult ♀ paratype (UPRM).

ETYMOLOGY. The selected epithet is an indeclinable noun in apposition, taken directly from the name of the island where this species was collected.

DIAGNOSIS. Adult size medium for the genus (male 12 mm, female 15 mm). Coloration yellowish brown, with a moderately dense pattern of dark brown spots all over the body and appendages; metasomal segment V and telson similarly spotted; tergites without clearly defined longitudinal dark bands; pedipalp fingers dark brown with yellowish tips. Pedipalps orthobothriotaxic (femoral trichobothrium d_2 present); fixed and movable fingers with nine principal rows of denticles, basal lobe/notch combination absent. Sternite V with the smooth patch moderately-sized and cordiform in male, small and teardrop-shaped in female. Metasoma moderately robust, with 10-10-8-8-5 complete carinae, most of which are finely serrate, segments II–IV dorsal lateral carinae with terminal denticle enlarged; intercarinal spaces finely and densely granulate. Telson vesicle smooth, subaculear tubercle moderate and blunt conical; aculeus shorter than vesicle. Pectinal tooth count 10/10 in both sexes; basal middle lamella conspicuously enlarged in both sexes; basal plate wider than long and unmodified in male, conspicuously longer than wide and spatulate in female.

DESCRIPTION (adult male holotype). **Coloration** (Figs. 1–2). Base color light yellowish brown, slightly paler on legs and venter and becoming slightly darker and with an orange shade on metasomal segment V and telson, densely spotted with dark brown all over the body and appendages, remarkably less on the ventral re-

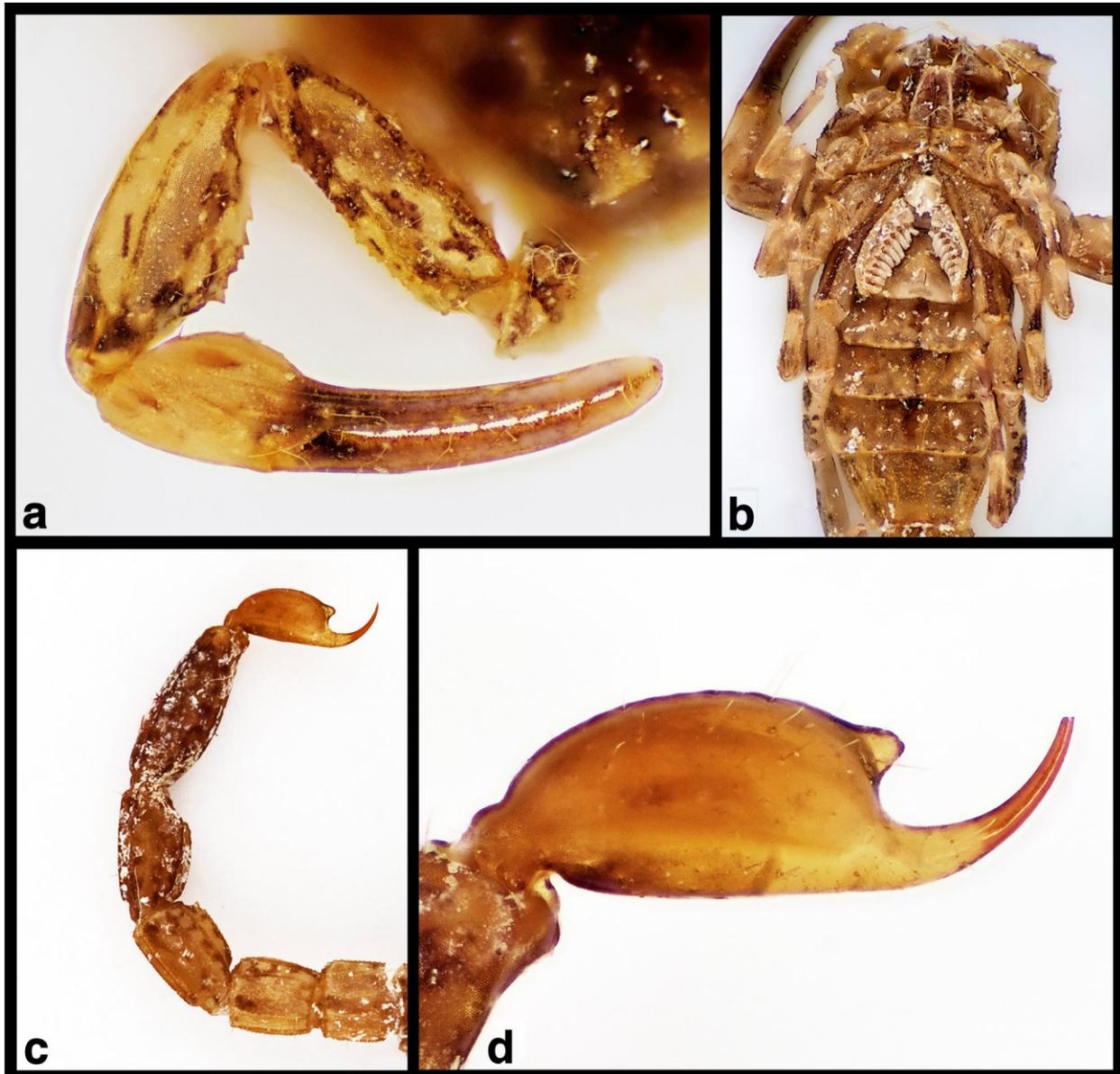


Figure 2: Holotype adult male of *Microtityus (Parvabsonus) vieques* sp. n.: pedipalp, dorsal view (a); prosoma and mesosoma, ventral view (b); metasoma and telson, lateral view (c); telson, lateral close-up (d).

gion. Chelicerae yellowish, with distal margin of manus and basal half of fingers deeply infuscate and subtle dark reticulations medially. Pedipalp femur very densely spotted with dark brown on all surfaces, except ventrally immaculate; patella very densely spotted with dark brown on all surfaces except ventral, which possesses spots only in the distal portion; chela with manus essentially immaculate, fingers moderately infuscate but with yellowish tips and two conspicuous dark spots (one basal, another subapical). Carapace symmetrically and densely spotted with dark brown, including frontal lobes; tergites densely spotted with dark brown, without clearly defined pattern of longitudinal dark bands; venter

sparsely spotted with dark brown all over leg coxae, sternum, genital operculum, and sternites; pectines immaculate whitish, including basal plate. Legs with trochanter, femur and patella very densely spotted with dark brown externally, sparsely spotted both dorsally and ventrally, but immaculate internally, tarsi conspicuously annulated: basal half blackish brown, distal half pale yellowish. Metasoma moderately reticulated with dark brown on all surfaces, spotted pattern not becoming denser or darker distally in any segment. Telson conspicuously paler, vesicle only faintly spotted with pale brown all over; aculeus immaculate, with the distal half dark brown.

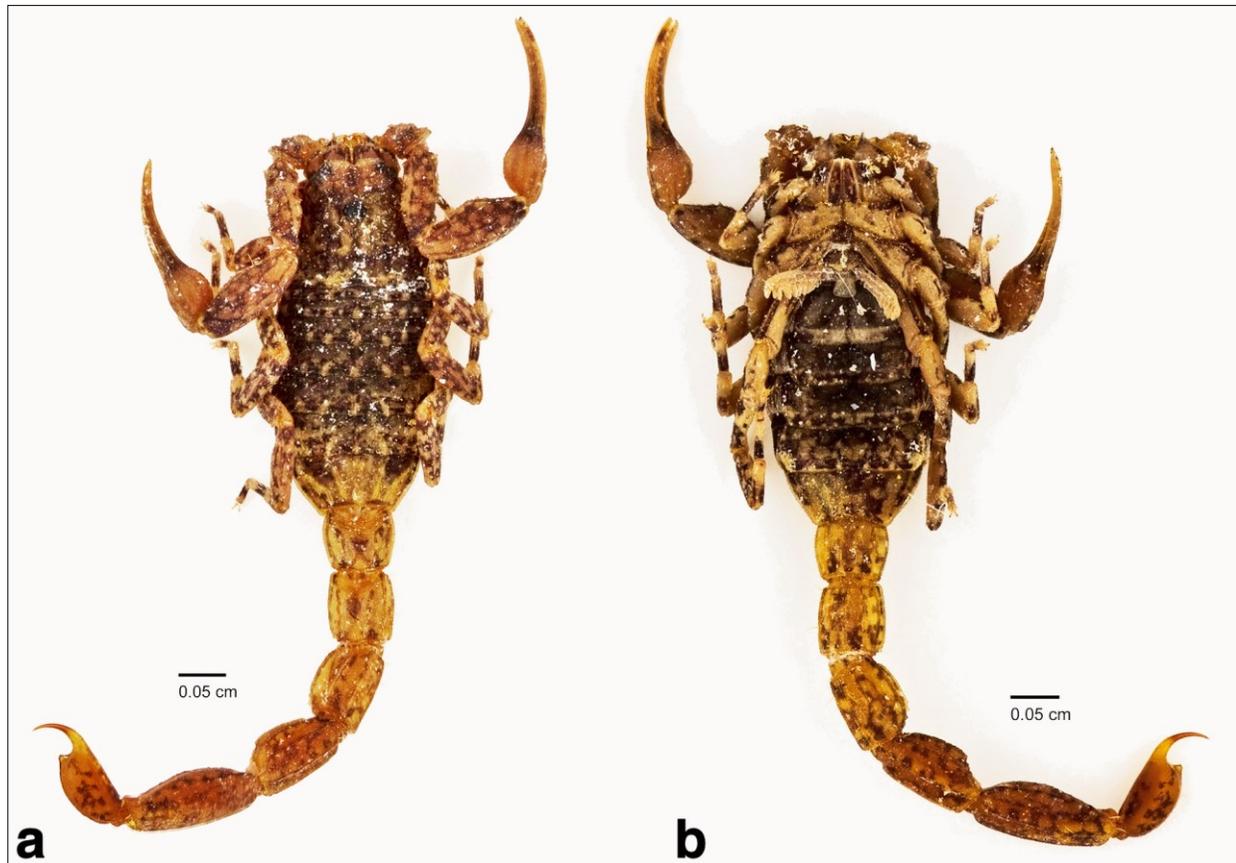


Figure 3: Paratype adult female of *Microtityus* (*Parvabsonus*) *vieques* sp. n.: dorsal (a) and ventral (b) views.

Chelicerae. Dentition typical of the genus. Tegument glossy, dorsodistal portion of manus with coarse, glossy granules irregularly arranged transversally, defining a depressed area. Setation very dense ventrally, but essentially lacking dorsally, except for a few rigid macrosetae around depressed area of manus.

Pedipalps (Fig. 2a). Size and shape standard for the genus. Orthobothriotaxic A- α (femur with d_2). Femur with five serrate to denticulate carinae, intercarinal tegument finely and densely granulose, with coarser granules scattered, internal surface with the four internal (*i*) trichobothria surrounding a conical spur of moderate size. Patella with seven serrate to crenulate carinae, intercarinal tegument with the same granular sculpture as on femur but finer, internal surface with 7–8 conspicuously larger denticles. Chela oval and much narrower than patella; manus with nine finely granulose to costate carinae, intercarinal tegument coriaceous to very finely granulose; fingers long and evenly curved, without basal lobe/notch combination, fixed finger with 9/9 principal rows of denticles, movable finger with 9/9 and an apical subrow of 4–5 denticles plus a large internal accessory denticle (large terminal denticle not included), terminal denticle of both fixed and movable

finger conspicuously enlarged and claw-like, overlapping each other when fingers closed.

Carapace. Subtriangular and slightly wider than long. Anterior margin very narrow and deeply bilobed. Carinae: anterior median, lateral ocular, central median and posterior median granulose, superciliary subgranulose, other carinae obsolete to absent. Tegument coriaceous to finely granulose, with coarser granules scattered. Median eyes separated by more than one ocular diameter; three pairs of lateral eyes, which are much smaller than median eyes.

Sternum (Fig. 2b). Standard for the genus: type 1, small and markedly pentagonal.

Genital operculum (Fig. 2b). Medium-sized, halves narrowly separated and semicircular in shape. Genital papillae medium-sized, slightly protruding.

Pectines (Fig. 2b). Relatively small (not reaching leg IV trochanter) and moderately setose; tooth count 10/10, teeth conspicuously swollen; basal middle lamella conspicuously enlarged, subtriangular. Basal plate subrectangular, wider than long, with posterior margin essentially straight.

Legs. Slender, with all carinae finely granulose to serrate; intercarinal tegument coriaceous to finely gran-

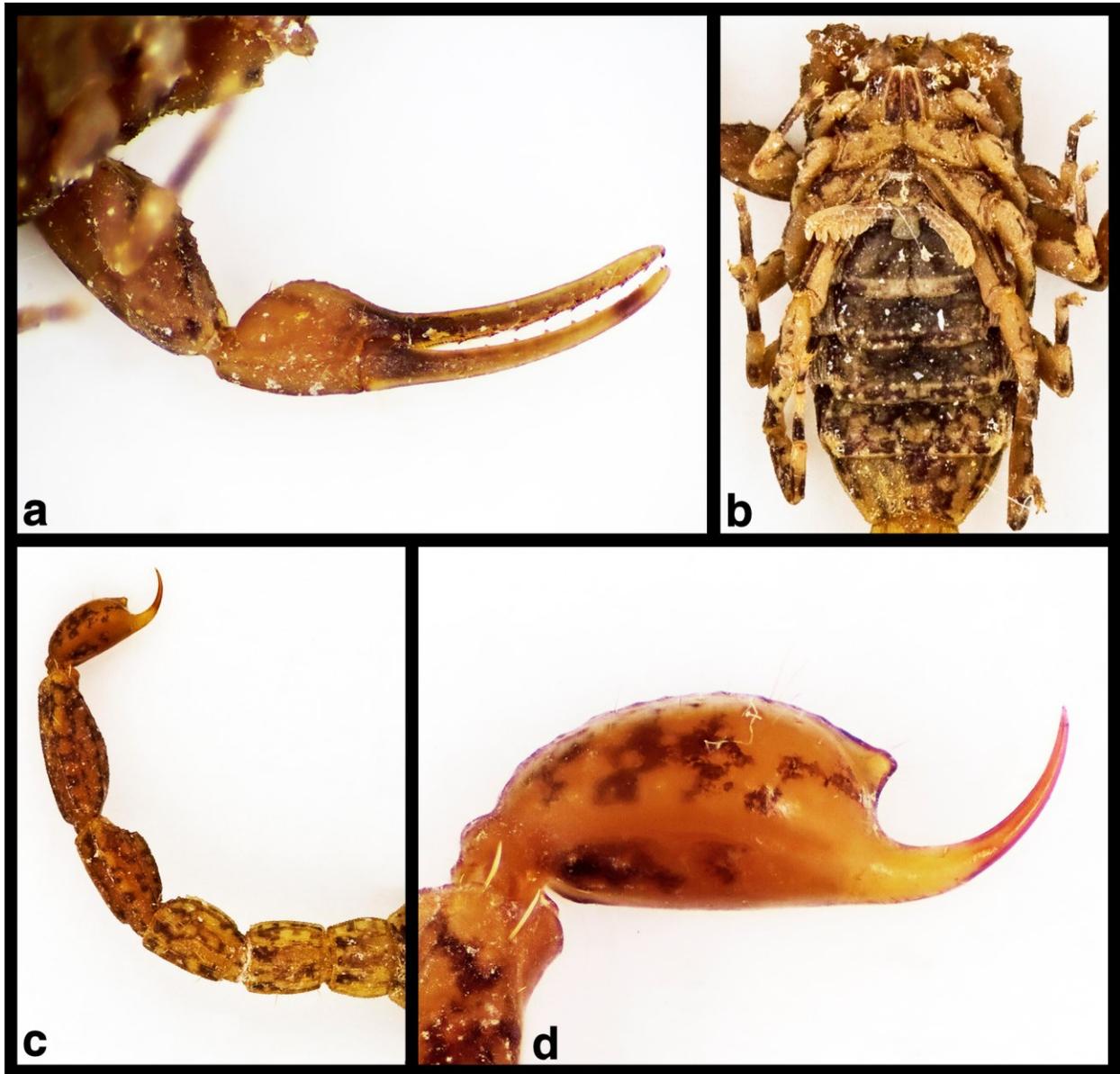


Figure 4: Paratype adult female of *Microtityus (Parvabsonus) vieques* sp. n.: pedipalp, ventral view (a); mesosoma, ventral view (b); metasoma and telson, lateral view (c); telson, lateral close-up (d).

ulose, with coarser granules scattered. Claws short and strongly curved.

Mesosoma (Fig. 2b). Tergites with the same granular sculpture as on carapace; I–VI with three longitudinal carinae, which are granulate and moderately projected beyond the posterior margin of every tergite (progressively less anteriorly), VII with five finely serrate longitudinal carinae. Sternites essentially glabrous, spiracles oblique and small, elongate-oval; posterior margin vestigially notched medially on III–VI, widely concave on VII; III acarinate, with the lateral areas shallowly depressed and essentially smooth, IV–VII with two pairs of granulate longitudinal carinae

(submedian and laterals), coriaceous to finely and densely granulate; smooth patch of V moderately large, cordiform, and translucent.

Metasoma (Fig. 2c). Size and shape standard for the genus. Segments I–II with ten complete carinae, II–IV with eight, V with five, all finely serrate on I–III, finely subcrenulate on IV–V; dorsal lateral carinae with terminal denticle moderately enlarged and sharp on I–III, subtly enlarged and blunt on IV. Intercarinal tegument finely and densely granulate.

Telson (Fig. 2d). Essentially bare, with a few rigid setae scattered all over. Vesicle oval, smooth and glossy to subtly coriaceous, with a vestigial ventral median car-

ina that obtusely rises into the subaculear tubercle, which points towards the apex of the aculeus and is moderately-sized, widely conical, blunt, smooth, and lacks any dorsal granules. Aculeus shorter than vesicle, very sharp, and evenly curved (extreme tip broken).

FEMALE (paratype, Figs. 3–4). Similar to male in coloration, but with well-marked sexual dimorphism: **(1)** size larger; **(2)** pedipalp manus slightly shorter and rounder; **(3)** genital papillae absent; **(4)** basal pectinal plate conspicuously longer than wide, with posterior margin spatulate; **(5)** mesosoma wider, with sides more convex; **(6)** smooth patch of V much smaller and teardrop-shaped; **(7)** metasomal segments and telson somewhat shorter, wider and deeper; **(8)** laterodistal apex of metasomal segment V each with two strongly modified setae: long, thick, shallowly curved upwards, and yellowish.

COMPARISON. This species is a typical representative of the subgenus *Parvabsonus* Armas, 1974, as it exhibits all characters defined as diagnostic by Armas & Teruel (2012). And it is most closely related to the two species which coincidentally are its nearest neighbors: *Microtityus santosi* Teruel, Rivera et Sánchez, 2014 and *Microtityus waeringi* Francke & Sissom, 1980, from Culebra and the Virgin Islands, respectively. But *M. vieques* **sp. n.** can be easily distinguished from all other congeners by a clearly autapomorphic character: the conspicuous enlargement of the basal middle lamella of pectines in both sexes; in all other species this lamella is only slightly to not at all enlarged in females, and never in males). Also, the presence of the two strongly modified setae on metasomal segment V of female (male may present them as well, but have detached) is unique to *M. vieques* **sp. n.** amongst the Puerto Rican members of the genus and has not been recorded previously from any other Caribbean or continental member of the genus, thus, it could be a second autapomorphic character if confirmed. Apart from this, the two above-mentioned species can be safely distinguished from *M. vieques* **sp. n.** as follows:

- *M. santosi* (only the adult female holotype is known): **(1)** pectinal basal plate unmodified, i.e., wider than long and not spatulate; **(2)** coloration different, e.g., tergites with dark spots irregularly arranged into three longitudinal stripes, pedipalp fingers evenly infuscate and without darker spots, pedipalp manus and telson vesicle more densely spotted; **(3)** metasoma with all carinae remarkably stronger, especially on segments IV–V; **(4)** telson vesicle smaller and more slender.
- *M. waeringi*: **(1)** smooth patch of sternite V absent in both sexes; **(2)** metasoma with all carinae remarkably stronger, especially on segment IV; **(3)** telson vesicle

smaller and more slender, with subaculear tubercle larger.

DISTRIBUTION (Fig. 9). This species is known only from the island of Vieques. For additional information, see the General Remarks section below.

REMARKS. Both type specimens have some minor preservation problems, obviously due to having been dried-up sometime: they are brittle, slightly shrunk and partially covered in a thin, chalky sediment. Nevertheless, there are no detached parts and all morphological characters relevant to a precise identification are visible without problems.

When the first records of *Microtityus* in Puerto Rico were published, therein was predicted that the genus was probably more widespread and diverse in this insular bank (Teruel et al., 2014: 10). The present contribution confirms that hypothesis and raises to three the number of its species occurring here. This represents also the 25th described member of its subgenus *Parvabsonus*, all being endemic from the Greater Antilles.

Tityus alejandroi Teruel, Rivera et Santos, **sp. n.**
(Figures 5–8, 10)

<http://zoobank.org/urn:lsid:zoobank.org:act:5C22E4CC-A969-421A-8514-628C4FFA584C>

TYPE DATA. **Puerto Rico**, Vieques Municipality, Vieques Island (most likely from Monte Pirata, in the western part of the island), pitfall trap, March 2011, J. L. Herrera, 1 adult ♂ holotype, 2 juvenile ♂♂ paratypes (UPRM).

ETYMOLOGY. We are pleased to name this beautiful species after our good friend and great Puerto Rican naturalist Alejandro J. Sánchez (“Father Sánchez”), in recognition to his important and continuous contributions to the knowledge of the Caribbean biota, especially the scorpions of Puerto Rico.

DIAGNOSIS (males only, female unknown). Adult size small for the genus, but standard for the species-group (32 mm). Coloration yellowish brown, with a very dense pattern of blackish spots and reticulations all over the body and appendages; pedipalp fingers blackish with yellowish tips; tergites without clearly defined longitudinal dark stripes; metasomal segment V and telson reddish brown. Pedipalps of size and shape standard for the genus; chelae with manus oval and slightly incrasate, fingers with 11–12 principal rows of denticles and basal lobe/notch combination moderate. Sternite V with the smooth patch moderately-sized and triangular. Metasoma only slightly attenuate, with 10-8-8-8-5 complete carinae, most of which are finely serrate, segments II–IV dorsal lateral carinae with terminal denticle only

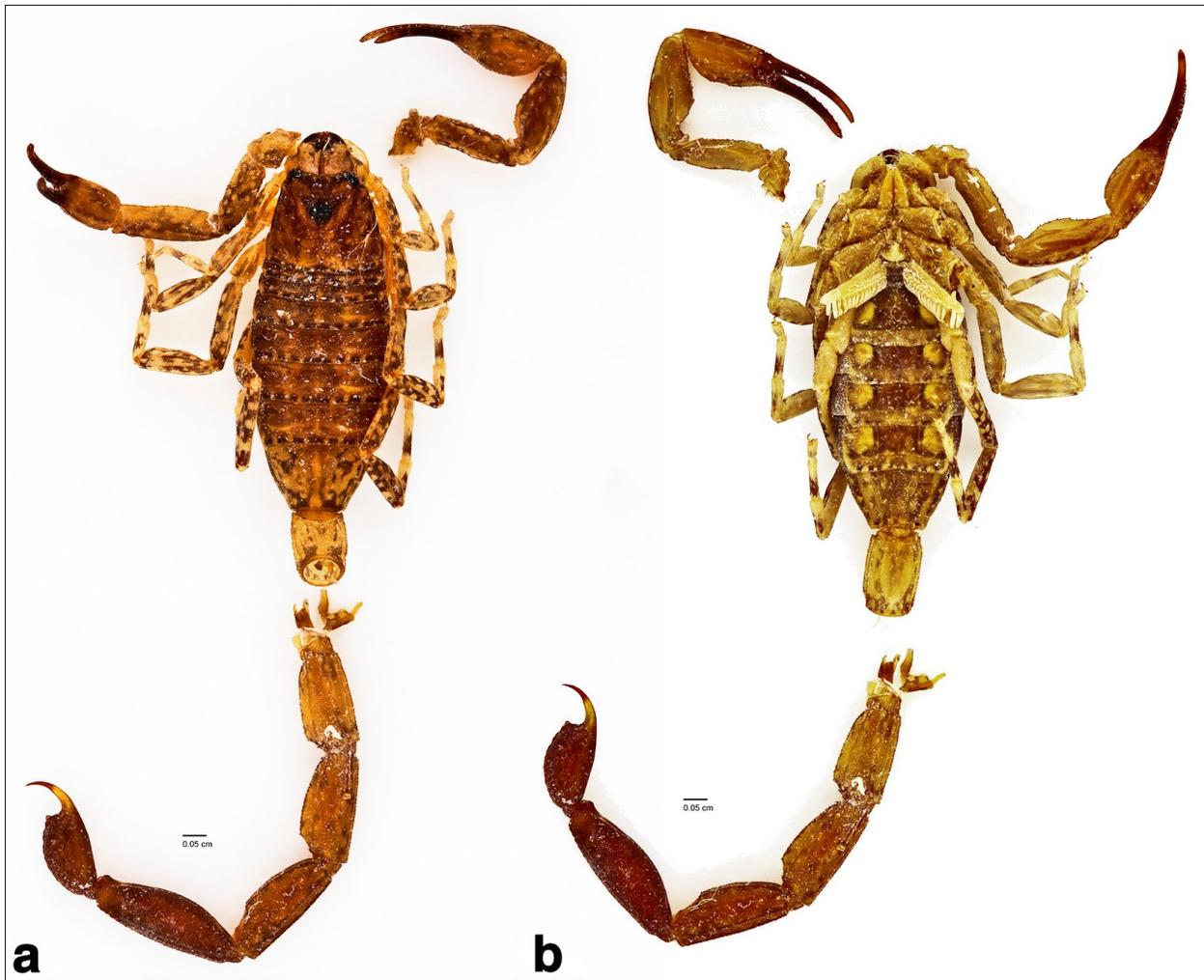


Figure 5: Holotype adult male of *Tityus alexandroi* sp. n.: dorsal (a) and ventral (b) views.

subtly enlarged; intercarinal spaces very finely and densely granulate. Telson vesicle inflate-oval and smooth, subaculear tubercle moderately small and blunt conical; aculeus much shorter than vesicle. Pectinal tooth count 16–18 (mode 17); basal middle lamella unmodified.

DESCRIPTION (adult male holotype). **Coloration** (Figs. 5–6). Base color yellowish brown, slightly paler on legs and venter and becoming conspicuously darker and with a reddish shade on metasomal segment V and telson, densely spotted and reticulated with blackish brown all over the body and appendages, remarkably less on the ventral region. Chelicerae pale yellowish, moderately reticulate with blackish brown on manus; fingers deeply infuscate, essentially blackish. Pedipalp femur densely spotted with blackish brown on all surfaces, except ventrally immaculate; patella densely spotted with blackish brown on all surfaces, except ven-

trally immaculate; chela manus moderately spotted with blackish brown on all surfaces (mostly over carinae), except ventrally immaculate, fingers blackish with yellowish tips. Carapace symmetrically and densely spotted with blackish brown all over, but conspicuously darker and denser along all margins; tergites densely spotted with blackish brown, without clearly defined pattern of longitudinal dark bands, but conspicuously darker and denser along posterior margin; venter with essentially the same dark pattern, but somewhat sparser and lighter; pectines essentially immaculate yellowish. Legs very densely spotted with blackish brown on all surfaces, except internally essentially immaculate, tarsi irregularly annulated: basal half dark, distal half pale. Metasoma progressively darker distally and moderately reticulated with blackish brown on all surfaces, especially over and around carinae, spotted pattern becoming slightly denser and darker distally in each segment. Telson same-colored as metasomal segment V;

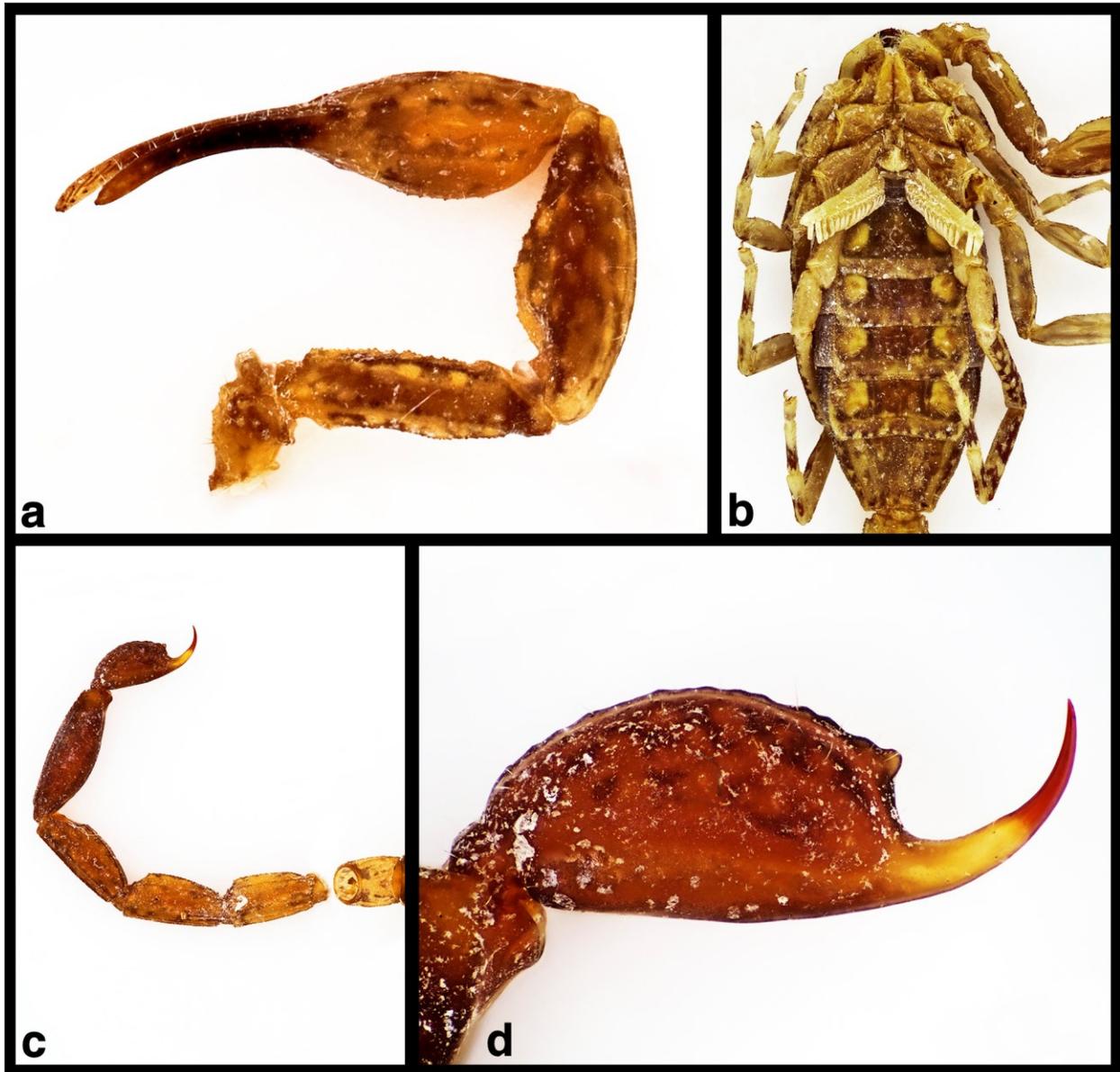


Figure 6: Holotype adult male of *Tityus alejandroi* sp. n.: pedipalp, dorsal view (a); prosoma and mesosoma, ventral view (b); metasoma and telson, lateral view (c); telson, lateral close-up (d).

vesicle moderately reticulated with blackish brown all over; aculeus immaculate, with basal half conspicuously paler and distal half dark brown.

Chelicerae. Dentition typical of the genus. Tegument glossy, dorsodistal portion of manus with coarse, glossy granules irregularly arranged transversally, defining a depressed area. Setation very dense ventrally, but essentially lacking dorsally, except for five rigid macrosetae around depressed area of manus.

Pedipalps (Fig. 6a). Size and shape standard for the genus. Orthobothriotaxic A- α . Femur with five strong, serrate to denticulate carinae, intercarinal tegument very finely and densely granulate, with coarser granules

scattered, internal surface without basal internal tubercle. Patella with seven moderate carinae, most subcostate to subrenulate except those on internal surface which are serrate, intercarinal tegument with the same granular sculpture as on femur but finer, internal surface without greatly enlarged denticles, only several slightly larger. Chela oval, slightly elongate and incrassate, wider than patella; manus with nine weak, finely costate to subgranulose carinae, intercarinal tegument coriaceous to very finely granulate, internal surface with many small, sharp denticles scattered; fingers moderately long and evenly curved, basal lobe/notch combination moderate, fixed and movable

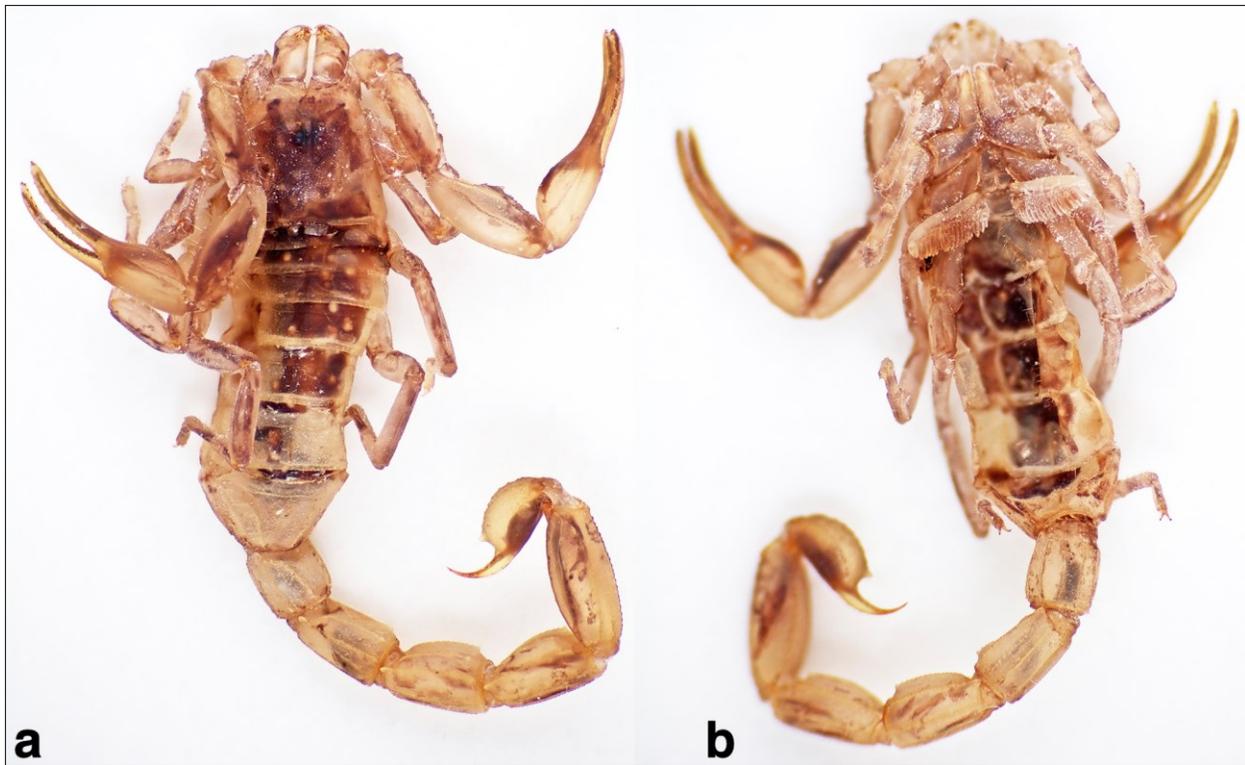


Figure 7: Paratype juvenile male of *Tityus alejandroi* sp. n.: dorsal (a) and ventral (b) views.

fingers with 11–12 principal rows of denticles (the two basal most rows irregularly fused), movable finger with an apical subrow of four denticles plus a large internal accessory denticle (large terminal denticle not included).

Carapace. Trapezoidal and wider than long. Anterior margin very widely V-shaped. Carinae very poorly defined. Tegument finely and densely granulose. Median eyes separated by about one ocular diameter; three pairs of lateral eyes, which are relatively large but smaller than median eyes.

Sternum (Fig. 6b). Standard for the genus: type 1, small and markedly pentagonal.

Genital operculum (Fig. 6b). Medium-sized, halves narrowly separated and teardrop-shaped. Genital papillae large, slightly protruding.

Pectines (Fig. 6b). Relatively small (not reaching leg IV trochanter), subrectangular, and moderately setose; tooth count 17/17 (apical tooth of right pecten broken and mostly missing, but remains still present allow an accurate count), teeth conspicuously swollen and straight; basal middle lamella unmodified (not enlarged), subrectangular. Basal plate subrectangular, wider than long, with posterior margin subtly convex.

Legs. Slender, with all carinae finely granulose to serrate; intercarinal tegument very finely and densely granulose, with coarser granules scattered externally; telotarsi with basal setation moderately dense and irreg-

ularly arranged into two longitudinal rows. Claws short and strongly curved.

Mesosoma (Fig. 6b). Tergites with the same granular sculpture as on carapace; I–VI with one longitudinal carina, which is granulose and not projected beyond the posterior margin of every tergite, VII with five finely serrate to serratocrenulate longitudinal carinae. Sternites sparsely setose, spiracles oblique and small, elongate-oval; posterior margin widely bilobed on III–VI, widely concave on VII; tegument coriaceous to finely granulose (stronger and denser on VII); smooth patch of V moderately-sized, widely subtriangular, and translucent.

Metasoma (Fig. 6c). Only slightly attenuate. Segment I with ten complete carinae, II–IV with eight (even though traces of lateral inframedian carinae remain on II as a row of few distal granules), V with five, all finely serrate on I–III, finely subcrenulate to serratocrenulate on IV, and weakly granulose to subgranulose on V; dorsal lateral carinae with terminal denticle only subtly enlarged and sharp on I–IV. Intercarinal tegument very finely and densely granulose, with coarser granules scattered.

Telson (Fig. 6d). Relatively large and sparsely setose. Vesicle inflate-oval, essentially smooth and coriaceous, with a coarse but moderate ventral median carina that obtusely rises into the subaculear tubercle,



Figure 8: Paratype juvenile male of *Tityus alexandroi* sp. n.: pedipalp chela, external view (a); metasomal segment V and telson, lateral view (b).

which points towards the apex of the aculeus and is moderately small, widely conical, blunt, smooth, and lacks any dorsal granules. Aculeus much shorter than vesicle, very sharp, and shallowly curved.

JUVENILE (paratypes, Figs. 7–8). The two available specimens are poorly preserved, but differ from the adult male holotype in those usual age-related characters: smaller size, pedipalps and metasoma much more slender, body and appendages less strongly sclerotized and sculptured, and telson with subaculear tubercle much larger and sharper (roughly spinoid). Pectinal tooth count 17/16 and 18/17, respectively.

COMPARISON. This species is a typical representative of the "quisqueyanus" species group of the genus, as it exhibits all characters defined as diagnostic by Armas & Abud (2004). The same applies to two other Puerto Rican species recently described by Santiago-Blay (2009), which had not been formally assigned to any species-groups yet and which are its closest relatives: *T. angelesae* and *T. juliorum*, thus, both are formally transferred herein to the "quisqueyanus" species-group. These two taxa can be safely distinguished from *T. alexandroi* sp. n. as follows:

- *T. angelesae* (only two adult females are known: the holotype and a second specimen from Juana Díaz examined by us; comparison based upon not sexually dimorphic characters): **1)** pedipalp movable finger with 13 principal rows of denticles; **2)** tergites with the dark pattern irregularly arranged into three longitudinal stripes; **3)** metasomal segment II with

10 complete carinae; **4)** metasomal segments and telson with tegument very coarsely granulose.

- *T. juliorum* (both sexes are known, but comparison based upon males only): **1)** size larger, up to 40 mm; **2)** metasomal segment V with lateral supramedian carinae stronger, serratocrenulate; **3)** metasoma and telson with intercarinal granulation coarser and denser; **4)** pectines with somewhat lower tooth count (15–17) and basal middle lamellae slightly enlarged and oval.

DISTRIBUTION (Fig. 10). This species is known only from the island of Vieques. For additional information, see the General Remarks section below.

REMARKS. The holotype has some minor preservation problems, obviously due to having been dried-up sometime: it is brittle (the right pedipalp and metasoma from segment II on are detached from the body), slightly shrunk and partially covered in a thin, chalky sediment. Nevertheless, there are no detached parts and all morphological characters relevant to a precise identification are visible without problems. The two juvenile paratypes are in very poor condition: both show evidence of having been severely dehydrated and consequently have become very brittle and translucent, with internal tissues and organs severely collapsed.

Armas (2010) recorded as *T. juliorum* three specimens (one adult female and two juveniles) collected by him in Patillas, in southeastern Puerto Rico. Nevertheless, these specimens were explicitly mentioned by Armas (2010) to differ slightly from typical *T. juliorum*



Figures 9-10: 9. Known geographical distribution of the genus *Microtityus* in Puerto Rico: *M. borincanus* (1), *M. santosi* (2), *M. vieques* sp. n. (3). 10. Known geographical distribution of the "quisqueyanus" species-group of the genus *Tityus* in Puerto Rico: *T. angelesae* (1), *T. juliorum* (2), *T. alexandroi* sp. n. (3). The single, questionable record of the second species from southeastern Puerto Rico (Armas, 2010) is marked with an outer circle.

and this site is located completely outside the known range of the species, which extends across the northern lowlands (Fig. 10). One of us (RT) directly examined that whole sample and confirmed those differences, but also noticed additional dissimilarities, e.g., the metasomal segments and telson of the adult are slightly shorter and noticeably less granulose than all *T. juliorum* we studied (which otherwise match the

original description and come from already known localities).

Interestingly, all observed differences match those that hypothetically should present the yet unknown female of *T. alexandroi* sp. n. and the involved locality is equally closer to Vieques. Nevertheless, the question that which species actually occurs at Patillas will remain unresolved until adults of both sexes become available

from both localities and may be directly compared to each other.

General remarks

The two species described herein were collected together in the same pitfall setup, thus, they both live syntopically. The exact collection site inside the island is imprecise: according to a personal communication of the collector to one of us (MJR), the pitfall traps were set in both extremes of the island, but the scorpions were most likely collected at Monte Pirata, in the western part. Anyway, Vieques is a small and homogeneous island and both species are probably widespread all over, at least in those areas with better preserved vegetation.

With the present contribution, the number of described scorpions confirmed to occur in Puerto Rico (including Mona and excluding the Virgin Islands) is raised to 19; an updated checklist is presented below:

Family Buthidae C. L. Koch, 1837

1. *Centruroides griseus* (C. L. Koch, 1844). Widespread and locally common in Puerto Rico and its satellite islets (Caja de Muertos, Culebra, Culebrita, Magueyes, and Vieques); occurs also all over the Virgin Islands. The single record from Desecheo Island (Santiago-Blay, 2009) needs to be verified and is probably erroneous.
2. *Centruroides jorgeorum* Santiago-Blay, 2009. Described from a single female from southeastern Puerto Rico (Patillas). Additional searches at the type locality have not produced additional specimens; its original description is very poor and fits the morphologically variable and widespread *C. griseus*, of which it is most likely a junior synonym.
3. *Centruroides mariaorum* Santiago-Blay, 2009. Described and still known only from Isla de Mona. Its original description is very poor and fits *Centruroides bani* Armas et Marcano, 1987 (also morphologically variable and widespread all over the neighboring island of Hispaniola), of which it could be a junior synonym.
4. *Centruroides sasae* Santiago-Blay, 2009. Described from a single male from southern Puerto Rico (Caja de Muertos Island). Intensive additional searches at the type locality by our team and collaborators have produced only specimens of *C. griseus*; the original description is very poor and fits this morphologically variable and widespread species, of

which it is most likely a junior synonym as previously suggested by Armas (2010) and even in the original description itself (Santiago-Blay, 2009).

5. *Isometrus maculatus* (DeGeer, 1778). The only precise locality for this cosmopolite species in Puerto Rico (San Juan) remains its first record from this territory (Banks, 1902); Santiago-Blay (2009) declared to have examined many specimens, but did not mention any specific locality. Additional searches by our team and collaborators all over the main island and adjacent islets have not produced additional specimens.
6. *Microtityus borincanus* Teruel, Rivera et Sánchez, 2014. Described from a single female from southwestern Puerto Rico (Susúa), where it seems to be endemic.
7. *Microtityus santosi* Teruel, Rivera et Sánchez, 2014. Described from a single female from Culebrita (a tiny islet offshore Culebra Island, in northeastern Puerto Rico, where it seems to be endemic).
8. *Microtityus vieques* **sp. n.** See description above.
9. *Rhopalurus virkkii* Santiago-Blay, 2009. Described and still known only from Isla de Mona. Its original description is very poor and fits *Rhopalurus abudi* Armas & Marcano, 1987 (from the easternmost part of the neighboring island of Hispaniola), of which it is most likely a junior synonym.
10. *Tityus alejandroi* **sp. n.** See description above.
11. *Tityus angelesae* Santiago-Blay, 2009. Described from a single female from southwestern Puerto Rico (Susúa), but we have examined a second female from the southeast (Juana Díaz); endemic. This species appears to be widespread but uncommon across the southern part of the main island. Originally not assigned to any group in the genus, it is formally transferred here to the "quisqueyanus" species-group.
12. *Tityus dasyurus* Pocock, 1897. Described originally from a single female from "Puerto Rico", but two additional specimens are known: a female from the Virgin Islands (St. Thomas) and a male from USA (Key West, Florida). It has never been found again in Puerto Rico des-

pite intensive searches by our team, thus, it is already extinct, extremely uncommon or a case of mislabeling. The third option seems most likely, as morphologically it is a typical member of the "asthenes" species group, which is widespread but restricted to mainland South America and adjacent parts of extreme western Central America.

13. *Tityus estherae* Santiago-Blay, 2009. Widespread but locally uncommon over mountainous areas of Puerto Rico; endemic. It was originally not assigned to any species-group in the genus; it is most closely related to *T. obtusus* and their assignment is currently under study by our team.
14. *Tityus juliorum* Santiago-Blay, 2009. Widespread and locally common across northern Puerto Rico; endemic. The single record from Patillas in the southeast (Armas, 2010) needs to be verified and could be erroneous, see above under *T. alexandroi* sp. n. Originally not assigned to any group in the genus, it is formally transferred here to the "quisqueyanus" species-group.
15. *Tityus michelii* Armas, 1982. Described from a single male from southwestern Puerto Rico (Guánica), only one additional specimen is known (a topotype male); endemic. Santiago-Blay (2009) regarded it as widespread all over Puerto Rico, but gave a diagnosis that do not match *T. michelii* entirely; our subsequent examination of several of those specimens revealed that all were misidentified and belong instead to *T. riverai*. This species appears to be extremely uncommon. Originally not assigned to any group in the genus, it was formally transferred to the "crassimanus" species-group by Teruel & Armas (2006).
16. *Tityus obtusus* (Karsch, 1879). Widespread and locally common all over Puerto Rico, recorded also from Vieques by Teruel & Sánchez (2010). It remains not assigned to any species-group in the genus; it is most closely related to *T. estherae* and their assignment is currently under study by our team.
17. *Tityus riverai* Teruel et Sánchez, 2009. Described from northwestern Puerto Rico (Río Grande), we have examined several additional specimens from localities scattered all over the main island (Mayagüez, Ponce, Corozal, Trujillo Alto, Naguabo, and El Yunque);

endemic. Thus, it is widespread but uncommon. Originally assigned to the "crassimanus" species-group by Teruel & Sánchez (2009).

Family Scorpionidae Latreille, 1802

Subfamily Diplocentrinae Karsch, 1880

18. *Cazierius garridoi* Armas, 2005. Described originally from central Puerto Rico (Cerro de Punta), but recorded later from Isla de Mona by Armas (2006); endemic. This distribution is highly unlikely, moreover, it has never been found again at the type locality despite intensive searches by our team. Thus, the holotype is apparently mislabeled and the species may prove to be endemic from Mona.
19. *Heteronebo portoricensis* Francke, 1978. Widespread and locally common in Puerto Rico and its nearest satellite islets (Caja de Muertos, Cueva, Guayacán, and Magueyes); endemic. The single record from Desecheo Island (Santiago-Blay, 2009) needs to be verified and is probably erroneous; we have examined the specimen from nearby Isla de Mona recorded by Armas (2005) as *Heteronebo* sp. and concur with his opinion that it does not appear to be conspecific with *H. portoricensis*.

It is worth to mention here that this list is not definitive: five of the 19 species are doubtful (four potential synonymies and one possibly erroneous record), and there is at least one that could represent an undescribed taxon (the *Heteronebo* population from Mona). Anyway, the potentially correct diversity of scorpions occurring in Puerto Rico places it in a third place amongst the Greater Antilles (after Cuba and Hispaniola), which satisfactorily matches the geographic extension of these insular territories.

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